

1 1. In the fabrication of organic thin film semiconductor devices wherein there is an
2 n-channel having contacts separated by said n-channel, the improvement for producing
3 high electron mobility in said n-channel without treatment of the interface between said
4 contacts and said organic thin film,

5 the improvement wherein said organic thin film is of a perylene tetracarboxylic acid
6 diimide compound.

1 2. The improvement of Claim 1 wherein:

2 said compound has a perylene 3,4,9,10 tetracarboxylic acid diimide structure.

1 3. The improvement of Claim 2 wherein:

2 said compound comprises a perylene 3,4,9,10 tetracarboxylic acid diimide structure
3 in which substituents attached to imide nitrogens in said diimide structure
4 comprise at least one of atom chains taken from the group of,

5 linear alkyl chains, branched alkyl chains, electron deficient alkyl groups, electron
6 deficient benzyl groups, chains having a length of four to eighteen atoms, and chains
7 having a length of eight atoms.

1 4. The improvement of Claim 3 wherein:

2 said compound is taken from the group of,

3 a perylene 3,4,9,10 tetracarboxylic acid diimide,

4 heterocyclic variations of said 3,4,9,10 perylene tetracarboxylic acid diimide,

5 N,N' dialkyl perylene 3,4,9,10 tetracarboxylic acid diimide in which alkyl chain length

6 is from four to eighteen carbon atoms, and,

7 N,N''di(n-octyl)alkyl perylene- 3,4,9,10- tetracarboxylic acid diimide.

1 5. The improvement of Claim 4 wherein said N,N''di(n-octyl)alkyl perylene-

2 3,4,9,10- tetracarboxylic acid diimide is N,N'-di(n-1H, 1 H-perfluorooctyl) perylene-

3 3,4,9,10- tetracarboxylic acid diimide.

1 6. The process for fabricating a semiconductor device having an n-channel semiconducting

2 film with external contacts separated by said channel, said device exhibiting a field effect

3 electron mobility greater than 0.01 cm²/Vs without prior treatment of said contacts,

4 comprising the steps of:

5 depositing onto a substrate as said n-channel semiconducting film,

6 a layer comprising a perylene tetracarboxylic acid diimide compound by sublimation,

7 said layer being formed on said substrate at a substrate temperature of less than 100

8 degrees C. during said sublimation.

1 7. The process of claim 6 wherein said semiconductor film is a layer of a perylene

2 3,4,9,10 tetracarboxylic acid diimide in which substituents attached to imide nitrogens in

3 said diimide structure

4 comprise at least one of atom chains taken from the group of,

5 linear alkyl chains, branched alkyl chains, electron deficient alkyl groups, electron

6 deficient benzyl groups, chains having a length of four to eighteen atoms, and chains

7 having a length of eight atoms.

1 8. The process of Claim 7 wherein the material of said semiconductor film is selected
2 from the group of,
3 perylene 3,4,9,10 tetracarboxylic acid diimide,
4 heterocyclic variations of said 3,4,9,10 perylene tetracarboxylic acid diimide,
5 N,N''dialkyl perylene 3,4,9,10 tetracarboxylic acid diimide in which alkyl chain length
6 is from four to eighteen carbon atoms, and,
7 N,N''di(n-octyl)alkyl perylene- 3,4,9,10- tetracarboxylic acid diimide.

1 9. The process of Claim 8 wherein said N,N''di(n-octyl)alkyl perylene-
2 3,4,9,10- tetracarboxylic acid diimide is N,N''-di(n-1H, 1 H-perfluorooctyl) perylene-
3 3,4,9,10- tetracarboxylic acid diimide.

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